

Lunar Exploration

SPACECRAFT	MISSION	LAUNCH DATE	ARRIVAL DATE	REMARKS
Pioneer 1 USA	Lunar Orbit	Oct 11, 1958		Did not achieve lunar trajectory; launch vehicle second and third stages did not separate evenly. Returned data on Van Allen Belt and other phenomena before reentering on October 12, 1958.
Pioneer 2 USA	Lunar Orbit	Nov 8, 1958		Third stage of launch vehicle failed to ignite. Returned data that indicated the Earth's equatorial region has higher flux and energy levels than previously believed. Did not achieve orbit.
Pioneer 3 USA	Lunar Probe	Dec 6, 1958		First stage of launch vehicle cut off prematurely; transmitted data on dual bands of radiation around Earth. Reentered December 7, 1958.
Luna 1 USSR	Lunar Impact	Jan 2, 1959		Intended to impact the Moon; carried instruments to measure radiation. Passed the Moon and went into solar orbit.
Pioneer 4 USA	Lunar Probe	Mar 3, 1959	Mar 4, 1959	Passed within 37,300 miles from the Moon; returned excellent data on radiation. Entered solar orbit.
Luna 2 USSR	Lunar Impact	Sep 12, 1959	Sep 15, 1959	First spacecraft to reach another celestial body. Impacted east of the Sea of Serenity; carried USSR pennants.
Luna 3 USSR	Lunar Probe	Oct 4, 1959		First spacecraft to pass behind Moon and send back pictures of far side. Equipped with a TV processing and transmission system, returned pictures of far side including composite full view of far side. Reentered Apr 29, 1960.
Pioneer P-3 USSR	Lunar Orbit	Nov 26, 1959		Payload shroud broke away 45 seconds after liftoff. Did not achieve orbit.
Ranger 1 USA	Lunar Probe	Aug 23, 1961		Flight test of lunar spacecraft carrying experiments to collect data on solar plasma, particles, magnetic fields, and cosmic rays. Launch vehicle failed to restart resulting in low Earth Orbit. Reentered August 30, 1961.

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Ranger 2 USA	Lunar Probe	Nov 18, 1961		Flight test of spacecraft systems for future lunar and interplanetary missions. Launch vehicle altitude control system failed, resulting in low Earth orbit. Reentered November 20, 1961.
Ranger 3 USA	Lunar Landing	Jan 26, 1962		Launch vehicle malfunction resulted in spacecraft missing the Moon by 22,862 miles. Spectrometer data on radiation were received. Entered solar orbit.
Ranger 4 USA	Lunar Landing	Apr 23, 1962	Apr 26, 1962	Failure of central computer and sequencer system rendered experiments useless. No telemetry received. Impacted on far side of the Moon.
Ranger 5 USA	Lunar Landing	Oct 18, 1962		Power failure rendered all systems and experiments useless; 4 hours of data received from gamma ray experiment before battery depletion. Passed within 450 miles of the Moon. Entered solar orbit.
Sputnik 25 USSR	Lunar Probe	Jan 4, 1963		Unsuccessful lunar attempt.
Luna 4 USSR	Lunar Orbiter	Apr 2, 1963		Attempt to solve problems of landing instrument containers. Contact lost as it passed the Moon. Barycentric orbit.
Ranger 6 USA	Lunar Photo	Jan 30, 1964	Feb 2, 1964	TV cameras failed; no data returned. Impacted in the Sea of Tranquility area.
Ranger 7 USA	Lunar Photo	Jul 28, 1964	Jul 31, 1964	Transmitted high quality photographs, man's first close-up lunar views, before impacting in the Sea of Clouds area.
Ranger 8 USA	Lunar Photo	Feb 17, 1965	Feb 20, 1965	Transmitted high quality photographs before impacting in the Sea of Tranquility area.
Ranger 9 USA	Lunar Photo	Mar 21, 1965	Mar 24, 1965	Transmitted high quality photographs before impacting in the Crater of Alphonsus. Almost 200 pictures were shown live via commercial television in the first TV spectacular from the Moon.

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Luna 5 USSR	Lunar Lander	May 9, 1965	May 12, 1965	First soft landing attempt. Retrorocket malfunctioned; spacecraft impacted in the Sea of Clouds.
Luna 6 USSR	Lunar Lander	Jun 8, 1965		During midcourse correction maneuver, engine failed to switch off. Spacecraft missed Moon and entered solar orbit.
Zond 3 USSR	Lunar Probe	Jul 18, 1965		Photographed lunar far side and transmitted photos to Earth 9 days later. Entered solar orbit.
Luna 7 USSR	Lunar Lander	Oct 4, 1965	Oct 7, 1965	Retrorockets fired early; crashed in Ocean of Storms.
Luna 8 USSR	Lunar Lander	Dec 3, 1965	Dec 6, 1965	Retrorockets fired late; crashed in Ocean of Storms.
Luna 9 USSR	Lunar Lander	Jan 31, 1966	Feb 3, 1966	First successful soft landing; first TV transmission from lunar surface. Three panoramas of the lunar landscape were transmitted from the eastern edge of the Ocean of Storms.
Cosmos 111 USSR	Lunar Probe	Mar 11, 1966		Unsuccessful lunar attempt. Reentered March 16, 1966.
Luna 10 USSR	Lunar Orbiter	Mar 31, 1966		First lunar satellite. Studied lunar surface radiation and magnetic field intensity; monitored strength and variation of lunar gravitation. Selenocentric orbit.
Surveyor 1 USA	Lunar Lander	May 30, 1966	Jun 2, 1966	First U.S. spacecraft to make a fully controlled soft landing on the Moon; landed in the Ocean of Storms area. Returned high quality images, from horizon views of mountains to close-ups of its own mirrors, and selenological data.
Lunar Orbiter 1 USA	Lunar Orbiter	Aug 10, 1966	Aug 14, 1966	Photographed over 2 million square miles of the Moon's surface. Took first photo of Earth from lunar distance. Impacted on the far side of the Moon on October 29, 1966.
Luna 11 USSR	Lunar Orbiter	Aug 24, 1966		Second lunar satellite. Data received during 277 orbits. Selenocentric orbit.

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Surveyor 2 USA	Lunar Lander	Sep 20, 1966	Sep 22, 1966	Spacecraft crashed onto the lunar surface southeast of the crater Copernicus when one of its three vernier engines failed to ignite during a mid-course maneuver.
Luna 12 USSR	Lunar Orbiter	Oct 22, 1966		TV system transmitted large-scale pictures of Sea of Rains and Crater Aristarchus areas. Tested electric motor for Lunokhod's wheels. Selenocentric orbit.
Lunar Orbiter 2 USA	Lunar Orbiter	Nov 6, 1966	Nov 10, 1966	Photographed landing sites, including the Ranger 8 landing point, and surface debris tossed out at impact. Impacted the Moon on October 11, 1967.
Luna 13 USSR	Lunar Lander	Dec 21, 1966	Dec 24, 1966	Soft landed in Ocean of Storms and sent back panoramic views. Two arms were extended to measure soil density and surface radioactivity.
Lunar Orbiter 3 USA	Lunar Orbiter	Feb 4, 1967	Feb 8, 1967	Photographed lunar landing sites; provided gravitational field and lunar environment data. Impacted the Moon on October 9, 1967.
Surveyor 3 USA	Lunar Lander	Apr 17, 1967	Apr 19, 1967	Vernier engines failed to cut off as planned and the spacecraft bounced twice before landing in the Ocean of Storms. Returned images, including a picture of the Earth during lunar eclipse, and used a scoop to make the first excavation and bearing test on an extraterrestrial body. Returned data on a soil sample. Visual range of TV cameras was extended by using two flat mirrors.
Lunar Orbiter 4 USA	Lunar Orbiter	May 4, 1967	May 8, 1967	Provided the first pictures of the lunar south pole. Impacted the Moon on Oct 6, 1967.
Surveyor 4 USA	Lunar Lander	Jul 14, 1967	Jul 17, 1967	Radio contact was lost 2-1/2 minutes before touchdown when the signal was abruptly lost. Impacted in Sinus Medii.
Lunar Orbiter 5 USA	Lunar Orbiter	Aug 1, 1967	Aug 5, 1967	Increased lunar photographic coverage to better than 99%. Used in orbit as a tracking target. Impacted the Moon on January 31, 1968.

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Surveyor 5 USA	Lunar Lander	Sep 8, 1967	Sep 10, 1967	Technical problems were successfully solved by tests and maneuvers during flight. Soft-landed in the Sea of Tranquility. Returned images and obtained data on lunar surface radar and thermal reflectivity. Performed first on-site chemical soil analysis.
Surveyor 6 USA	Lunar Lander	Nov 7, 1967	Nov 9, 1967	Soft-landed in the Sinus Medii area. Returned images of the lunar surface, Earth, Jupiter, and several stars. Spacecraft engines were restarted, lifting the spacecraft about 10 feet from the surface and landing it 8 feet from the original site.
Surveyor 7 USA	Lunar Lander	Jan 7, 1968	Jan 9, 1968	Landed near the crater Tycho. Returned stereo pictures of the surface and of rocks that were of special interest. Provided first observation of artificial light from Earth.
Luna 14 USSR	Lunar Orbiter	Apr 7, 1968		Studied gravitational field and "stability of radio signals sent to spacecraft at different locations in respect to the Moon." Made further tests of geared electric motor for Lunokhod's wheels. Selenocentric orbit.
Zond 5 USSR	Circumlunar	Sep 15, 1968		First spacecraft to circumnavigate the Moon and return to Earth. Took photographs of the Earth. Capsule was recovered from the Indian Ocean on September 21, 1968. Russia's first sea recovery.
Zond 6 USSR	Circumlunar	Nov 10, 1968		Second spacecraft to circumnavigate the Moon and return to Earth "to perfect the automatic functioning of a manned spaceship that will be sent to the Moon." Photographed lunar far side. Reentry made by skip-glide technique; capsule was recovered on land inside the Soviet Union on November 17, 1968.
Luna 15 USSR	Lunar Sample Return	Jul 13, 1969	Jul 21, 1969	First lunar sample return attempt. Began descent maneuvers on its 52nd revolution. Spacecraft crashed at the end of a 4 minute descent in the Sea of Crises.
Zond 7 USSR	Circumlunar	Aug 7, 1969		Third circumlunar flight. Far side of Moon photographed. Color pictures of Earth and Moon brought back. Reentry by skip-glide technique on August 14, 1969.

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Cosmos 300 USSR	Lunar Probe	Sep 23, 1969		Unsuccessful lunar attempt. Reentered September 27, 1969.
Cosmos 305 USSR	Lunar Probe	Oct 22, 1969		Unsuccessful lunar attempt. Reentered October 24, 1969.
Luna 16 USSR	Lunar Sample Return	Sep 12, 1970	Sep 20, 1970	First recovery of lunar soil by an automatic spacecraft. Controlled landing achieved in Sea of Fertility; automatic drilling rig deployed; samples collected from lunar surface and returned to Earth on September 24, 1970.
Zond 8 USSR	Circumlunar	Oct 20, 1970		Fourth circumlunar flight. Color pictures taken of Earth and Moon. Russia's second sea recovery occurred on October 27, 1970, in the Indian Ocean.
Luna 17 USSR	Lunar Rover	Nov 10, 1970	Nov 17, 1970	Carrying the first Moon robot, soft landed in Sea of Rains. Lunokhod 1, driven by 5-man team on Earth, traveled over the lunar surface for 11 days; transmitted photos and analyzed soil samples.
Luna 18 USSR	Lunar Lander	Sep 2, 1971		Attempted to land in Sea of Fertility on September 11, 1971. Communications ceased shortly after command was given to start descent engine.
Luna 19 USSR	Lunar Orbiter	Sep 28, 1971		From lunar orbit, studied Moon's gravitational field; transmitted TV pictures of the surface. Selenocentric orbit.

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Luna 20	Lunar Sample Return	Feb 14, 1972		Soft landed in Sea of Crises. Used "photo-telemetric device" to relay pictures of surface. A rotary-percussion drill was used to drill into rock; samples were lifted into a capsule on ascent stage and returned to Earth on Feb 25, 1972.
Luna 21	Lunar Rover	Jan 8, 1973	Jan 15, 1973	Carried improved equipment and additional instruments; second Lunokhod rover soft landed near the Sea of Serenity. Lunar surface pictures were transmitted and experiments were performed. Ceased operating on the 5th lunar day.
Luna 22	Lunar Orbiter	May 29, 1974	Jun 2, 1974	Placed in circular lunar orbit then lowered to obtain TV panoramas of high quality and good resolution. Altimeter readings were taken and chemical rock composition was determined by gamma radiation. Selenocentric orbit.
Luna 23	Lunar Sample Return	Oct 28, 1974		Landed on the southern part of the Sea of Crises on November 6, 1974. Device for taking samples was damaged; no drilling or sample collection possible.
Luna 24	Lunar Sample Return	Aug 9, 1976	Aug 14, 1976	Landed in Sea of Crises on August 18, 1976. Carried larger soil carrier. Core samples were drilled and returned. U.S. and British scientists were given samples for analyses.
Clementine USA	Lunar Flyby	Jan 25, 1994		Carrying ultraviolet/visible and near-infrared cameras, mineralogical mapping of the moon will enhance the scientific knowledge of the surface for future exploration. The mission failed in its attempt to flyby the asteroid Geographos.